TRANSITIONS IN WELFARE PARTICIPATION AND FEMALE HEADSHIP

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Abstract

This study uses data from the 1990, 1992, 1993, and 1996 panels of the Survey of Income and Program Participation to examine how welfare policies and local economic conditions contribute to women's transitions into and out of female headship and into and out of welfare participation. It also examines whether welfare participation is directly associated with longer spells of headship. The study employs a simultaneous hazards approach that accounts for unobserved heterogeneity in all of its transition models and for the endogeneity of welfare participation in its headship model. The estimation results indicate that welfare participation significantly reduces the chances of leaving female headship. The estimates also reveal that more generous welfare benefits contribute indirectly to headship by increasing the chances that mothers will enter welfare. More generous Earned Income Tax Credit benefits are associated with longer spells of headship, nonheadship, and welfare participation and nonparticipation. Other measures of welfare policies, including indicators for the adoption of welfare waivers and the implementation of Temporary Assistance for Needy Families programs, are generally not significantly associated with headship or welfare receipt. Better economic opportunities are estimated to increase headship but reduce welfare participation among unmarried mothers.

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INTRODUCTION

Policymakers have long expressed concern over the linkage between welfare use and family structure. In the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996, Congress and the President sought changes that would not only promote work and reduce welfare dependence but also support two-parent families and discourage single-parenthood. In the current proposals to reauthorize PRWORA, family structure has become even more central.

Researchers, too, have been keenly interested in understanding how welfare policies affect demographic outcomes including births, marriages, and living arrangements. The studies in this area have generally examined reduced-form associations between policies and demographic behaviors. Few of the studies on demographic outcomes have considered how policies might operate through welfare participation or how participation might directly affect demographic behavior. Reduced-form strategies are useful in establishing gross relationships but not in unpacking the structural determinants of those relationships. Reduced-form strategies also avoid some of the thorny problems associated with sorting out endogenous relationships. In the case of welfare participation and demographic behavior, there are likely to be issues of shared unobserved determinants. Failure to account for these determinants could lead to spurious correlations.

In this paper we estimate transition models into and out of female headship and into and out of welfare participation that allow unobserved heterogeneity to be correlated among the various transitions. We further allow the transition out of female headship to directly depend on welfare participation status, thereby estimating a structural direct effect. We thus address whether being on welfare directly reduces the likelihood that a women leaves headship (which would be primarily by marriage) after properly controlling for individual heterogeneity. We employ Lillard's (1993) simultaneous hazard approach to estimate the model using individual data from the 1990, 1992, 1993 and 1996 panels of the Survey of Income and Program Participation (SIPP). These data are augmented by contextual data on state-level welfare policies, state and federal Earned Income Tax Credit (EITC) policies, and county-level labor and marriage market conditions. In the end, we find that participation in welfare does reduce the chance of leaving female headship and that welfare policies affect headship through program participation.

BACKGROUND AND SIGNIFICANCE

Concern among policymakers and the public about rising female headship in the United States is not without foundation. Female-headed families tend to have higher poverty rates and more welfare usage than do two-parent families (Lerman, 1996). Children of female-headed families typically have worse schooling/developmental outcomes than those living with two parents (Haveman and Wolfe, 1994; McLanahan and Sandefur, 1994)[1]. Welfare reform legislation and its emphasis on encouraging two-parent families is a manifestation of this concern.

A large literature has developed concerning the impact of welfare programs on demographic decisions that give rise to female headship. Murray (1984) suggests that welfare programs are responsible for the growth in female headship. Single parents are categorically eligible for AFDC/TANF whereas two-parent families can receive aid only when the primary earner is disabled or has very limited earnings (under the AFDC-UP program). Thus he argues that welfare encourages single-parenthood. Basic program trends would seem to undercut this argument, however. Benefits under cash assistance programs have eroded in value since the 1970s while headship has continued to grow.

Empirical research on the linkage between welfare benefits and family structure is also equivocal about the magnitude of the effect. Moffitt (1998) reviews a large number of studies on the impact of welfare benefit levels on fertility and marriage and concludes that there is evidence that welfare may encourage fertility and discourage marriage, but the size of the effect is likely small. Others have also surveyed the literature on marriage, cohabitation, fertility, and divorce and reached similar conclusions,

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[1] Some studies, however, document that bad marriage situations may be worse for children than single parenthood (Amato, Loomis, and Booth, 1995; Jekielek, 1998; Morrison and Coiro, 1999; Hofferth and Anderson, 2003). DeLeire and Kalil (2002) argue that single-parent multigenerational families can be beneficial. Further, Amato's 1993 review of the literature notes that many studies find insignificant associations between family structure and child well-being.

although they have noted that the results in the underlying studies are somewhat mixed (Acs, 1995; Hoynes, 1997b; Moffitt, 1995, 2001; Ribar, 1998).

Both experimental and observational studies have addressed the impact of welfare programs. Many states performed experimental evaluations of welfare rule changes initiated as waivers. Although these evaluations were not primarily designed to investigate demographic impacts, they potentially provide evidence. Gennetian and Knox (2003) conducted a meta-analysis of waiver experiments and concluded that they showed little consistent evidence of demographic effects. Blank's (2002) summary also concludes that state evaluations have generated inconsistent findings regarding the effects of waiver programs on marriage (see also the surveys by Grogger, Karoly, and Klerman, 2001; Harvey, Camasso, and Jagannathan, 2000; and Bitler, Gelbach, and Hoynes, 2002). Experimental studies have the virtue of a clean design with no policy endogeneity, but observational studies can examine broader populations under more varied environments.

Some observational studies have investigated these issues using aggregate or state-level data: see Schoeni and Blank (2000), Horvath-Rose and Peters (2001), and Bitler, Gelbach, Hoynes, and Zavodny (2002). All find significant impacts of waivers on demographic decisions. Yet aggregate data can suffer from composition effects whereby it is difficult to properly condition on individual traits. Nor can aggregate studies control for duration effects.

A number of studies have estimated models of welfare transitions based on individual data: see Blank (1999), Blank and Ruggles (1996), Fitzgerald (1995), Gittleman (2001), Klerman and Haider (2000), and Ribar (2002). Moffitt (2002) offers a comprehensive survey and reports that most studies show that welfare benefits and labor market conditions have an impact on time spent on welfare. But the studies do not jointly consider female headship. Studies that consider family structure transitions such as Moffitt and Rendell (1995), Bitler, Gelbach, Hoynes, and Zavodny (2002), and Fitzgerald and Ribar (2003) do not jointly model welfare participation. In this paper we jointly model the two decisions.

Discrete choice models of demographic decisions and welfare have been used to jointly model the marriage/fertility and welfare choice. Duncan and Hoffman (1990) found little effect of benefit levels on births for black teens, and Hoffman and Duncan (1995) found little effect of benefits on divorce. Rosensweig (1999) found that higher AFDC benefits substantially increased the probability of a nonmarital birth for low-income women. His model allowed choices among three states—unmarried and childless, unmarried and with children, and married—and allowed for unobserved correlations in the utility in each state. He did not model the direct effect of participation in welfare.

Keane and Wolpin (2002) estimated a structural dynamic lifetime model that included welfare participation, fertility, marriage, work, and school attendance using data from the National Longitudinal Survey of Youth (NLSY79). They reported that welfare benefits had significant impacts on welfare participation, work, and schooling decisions, but no significant effect on fertility and marriage decisions.

More closely related to our work, Teitler et al. (2003) have recently undertaken a preliminary analysis of the direct relationship between welfare participation and spells of unmarried motherhood. Their analysis followed mothers from the Fragile Families and Child Wellbeing study who were unmarried at the time of their children's births and estimated hazard models of the women's transitions into marriage. The models distinguished between women who were imputed to be eligible or ineligible for TANF as well as those who reported participating or not participating in the program. Their preliminary results, which did not account for the endogeneity of eligibility and participation, indicated that welfare participation was not strongly associated with marriage.

Endogeneity of welfare participation decision could occur because unobserved characteristics of women prone to participate in welfare may also make them less likely to marry. Without proper controls for this heterogeneity, these unobserved characteristics could induce a spurious correlation between welfare use and exit from headship.

Our paper extends the literature by using individual-level longitudinal data in a joint model of welfare and headship transitions. We allow these transitions to be linked by unobserved heterogeneity in a simultaneous hazard model. Furthermore, we allow headship transitions to depend directly on welfare participation. We estimate the impacts of welfare benefits, welfare waiver adoption and TANF adoption, and the EITC. Moffitt (1995, 1998) and others have noted that studies of welfare effects on demographic changes must be careful to control for the economic and policy environment across states so that welfare impacts do not become confounded with other changes. In this paper we control for skill-specific county-level measures of the labor market and county-level marriage market variables to address these concerns.

CONCEPTUAL MODEL

Women become female heads of families in two ways—nonmarital births or divorce/separation/widowhood by married women with children. The decisions that lead to a nonmarital birth include the decision to become sexually active, choice of birth control, the decision to carry the child to term and keep the child, and the decision not to marry. Women leave single-motherhood by marriage or by having the child age to adulthood or move out. Welfare benefits and rules can affect these choices. Benefit levels will also affect the decision to participate in welfare if eligible, and participation itself might directly affect female headship decisions. To help guide the interpretation of results, we offer a simple rational choice model of the welfare participation and headship decision based on Becker (1981). More detailed conceptual analyses are offered in Hoynes (1997a, b), Peters, Plotnick, and Joeng (2003), and Gennetian and Knox (2003), and interested readers are referred there.

In a rational choice model, individuals consider the possible situations in which they might find themselves: single or married, with or without children, and on or off welfare. In our context they choose between being a female head of family (unmarried and with children) or not (either married or childless). If they are female heads, they can choose to participate in welfare or not. Women choose the option that gives them the most expected lifetime utility. These choices can change over time as circumstances and the environment change producing transitions into and out of headship and welfare participation. This simple framework allows us to make some predictions about how welfare benefits and rules and labor market conditions will affect headship and participation.

Increases in welfare benefits or rule changes that make welfare more generous, such as a waiver to expand the earned income disregard, increase the utility of being on welfare if eligible. Since female heads are categorically eligible, this raises relative expected utility of female headship. This should increase entry into headship and decrease exit from it. It should also increase welfare participation. Waivers that restrict eligibility or make welfare more onerous would be expected to have the opposite effect. As pointed out by Teitler et al. (2003), however, eligibility restrictions could have different impacts on headship choices depending on whether a woman is currently participating in welfare or not. An eligibility restriction might make welfare less attractive and encourage an unmarried mother not on welfare to marry, yet make a woman already on welfare less likely to marry or cohabit to avoid losing eligibility.

Labor market conditions affect choices as well. A woman in a good labor market with high wages can expect higher earnings in both the married and unmarried states. But since earnings will presumably be shared in a marriage, higher wages will increase utility in the single state by more and will thus reduce marriage by what is usually called the independence effect. Complicating this, higher male wages in an area also raise the quality of marriage prospects and the possibility of marrying. Furthermore, higher wages and employment are likely to affect fertility by increasing the opportunity cost of having children but also by increasing the resources available to raise them. Thus higher wages and better employment prospects will have ambiguous effects on female headship.

A better labor market could also have ambiguous effects on welfare participation. For nonparticipants, better earnings could reduce their eligibility or encourage independence. But since many women work while on welfare it also raises the utility of remaining on welfare. Empirical research is needed to sort out the impacts.

DATA CONSTRUCTION

Data preparation is divided into three tasks. We first use individual-level data on women from the SIPP to construct spells of headship and nonheadship and spells of welfare participation and nonparticipation. These data also provide information on other personal and background characteristics of the women. Second, we augment this information with data on welfare policies and EITC benefits based on each woman's state of residence. Third, we add contextual variables about labor and marriage market conditions in the woman's county of residence. We restrict our sample to women aged 15–55.

<u>Individual Data from SIPP</u>

We pool data from the 1990, 1992, 1993, and 1996 panels of SIPP. These data span the period from October 1989 to February 2000. This is an opportune period in which to observe behavioral responses to policy. During the 1990s, states modified their welfare programs by obtaining waivers from federal rules governing their programs. Many of these changes were incorporated into the 1996 PRWORA, though this bill also affected states that had not adopted waivers. In addition to the dramatic changes in welfare policies, the Earned Income Tax Credit was also adjusted substantially over this period.

The SIPP includes detailed information on individual and family demographic characteristics as well as the use of government transfer programs. The SIPP is a national survey that oversamples low-income households, but is nationally representative when weighted by survey weights. The respondents are interviewed every 4 months and asked about monthly activities during the prior 4 months. These 4-month interview periods are called waves. The panels vary in length from 32 to 48 months and in size from roughly 20,000 to 40,000 households. This large number of individuals gives us a sizable number of transitions even though the panels are fairly short.

We use the SIPP to define spells of female headship as well as spells of welfare receipt. We define a female head of family as a woman who is unmarried and living with related children aged 17 or less.[2] We include women who are heads of subfamilies. We define an indicator for headship and then compute spells of headship and nonheadship based on the entire monthly sequence of headship indicators

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[2]Those who are "married spouse absent" are counted as married.

during course of the panel. Thus we will potentially observe multiple transitions as a woman moves into and out of headship. We include only spells of headship or nonheadship that begin during the panel, that is, those that are uncensored or right-censored. While excluding left-censored spells leads to considerable sample loss, it correctly produces a sample of new spells to which our results apply.

We construct spells of welfare participation and nonparticipation in a similar way based on the monthly data. We define a woman as a participant if she receives AFDC or TANF income as the head of a family unit. Conceivably, welfare spells could be defined independently of female headship, but eligibility requirements link the two. We define spells of welfare receipt and nonreceipt only for women who are female heads and are thus categorically eligible. Because of this, we do not examine participation in the Unemployed Parent programs of AFDC and TANF. Spells of welfare receipt or nonreceipt that are ongoing at the start of a headship spell are artificially left-censored at that point. Similarly, spells of welfare receipt or nonreceipt that are observed to continue after a woman exits headship are artificially right-censored. Thus, our measures of welfare transitions should be viewed as those that occur during headship. Within a given headship spell, there may be a single spell of welfare receipt or nonreceipt or multiple spells on and off of welfare.

In addition to the demographic and welfare information used to construct spell histories, the SIPP provides personal information such as age, race, and education, and whether the women lives in a metropolitan area.

The SIPP also provides information on geographic residence. We need residence information to assign values for welfare policy and labor and marriage market conditions, all of which vary by location and time. The public use version of the SIPP does not release county of residence nor does it fully report state of residence or MSA in order to preserve respondent confidentiality. To separate out the impact of welfare rule changes and labor and marriage market changes, we desire county of residence data so that we can use county variation to isolate labor market and marriage market effects. By special arrangement, we obtained permission to use the internal/confidential versions of the census files that reported county and state of residence.[3] This permitted us to match detailed contextual data.

Table 1 provides information about the characteristics of individuals in the top panel (a) followed by characteristics of spells in the bottom panel (b). Most spells are right-censored. The nonheadship spells are by younger individuals with less education because many of those spells begin with a woman aged 15. Welfare participants tend to be younger and less educated than nonparticipants. The second panel also displays time-varying characteristics of spells. In principle, the periodicity of the SIPP allows the time-varying characteristics to be updated every month. To reduce the number of observations, however, the analysis only updated these characteristics in the fourth month of every wave. The number of observations listed at the bottom of the table shows the total number of waves of data for each spell type.

Welfare Policy Parameters

The decision to receive welfare will depend on the level of benefits as well as other rules that affect eligibility. These will vary by state and over time. For benefits, we use the maximum benefit available for a family of three,[4] deflated to 1992 dollars using the CPI-U. We choose a measure that does not vary by family size to avoid potential endogeneity of benefits based on fertility.

The remaining welfare policy parameters are indicators of specific rules. States experimented with many rule changes using waivers of federal policy up through 1996 when PRWORA was passed. These waivers were adopted by different states at different times allowing us to identify their effects. TANF was also implemented at different times in different states, although within a narrow 14-month window. We use information on waiver adoption and TANF adoption primarily from the U.S. Department of Health and Human Services (HHS) (1997) and Crouse (1999). HHS formed the waivers

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[3]The work was done at the U.S. Census Bureau Boston Research Data Center and the Center for Economic Studies in Washington, DC. The results have been screened to insure that no confidential data are revealed and are approved for release.

[4]From U.S. Committee on Ways and Means *Greenbook*, various years.

into main groups and determined when these were adopted statewide. Our measures include whether a state adopted any major waiver or whether it adopted specific waivers for a total lifetime limit on benefits (a termination limit), a reduced time limit before work was required (work time limit), a family cap that denies or reduces benefits to women who have children while on welfare (family cap), increased sanctions for failure to participate in the JOBS program or a reduction in the age of the youngest child for which the mother was required to participate in JOBS (JOBS sanctions), and more generous earned income disregards (earnings disregard).

We also used information on whether the state had relaxed rules for eligibility for the AFDC-UP program for married couples and whether a state had adopted a rule requiring teenage mothers to coreside with parents in order to receive benefits (teenage coresidence).[5] Finally, we defined an indicator for whether the state had implemented TANF. All of these indicators are time varying, with a value of zero prior to adoption and one thereafter based on the month and year of adoption. Table 1 shows that a sizable amount of our observed spell time occurs after the adoption of some type of welfare waiver. In earlier work (Fitzgerald and Ribar, 2003), we experimented with other variations on dating the waivers such as using implementation rather than adoption dates and using lags. Our overall results did not change substantially.

Besides welfare policy, we also include a variable that measures the generosity of the EITC. This program supplements earnings for low-wage workers, and thus interacts indirectly with welfare. It was expanded substantially in the 1990s, and so we need to be careful to control for its impact. We include a variable that measures the maximum credit for a family with two or more children, in 1992 dollars.[6]

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[5]For teenage coresidence, we used information from the Urban Institute's Welfare Rules Database (WRD), measured on a yearly basis. There were some inconsistencies between old and new versions of the WRD, and we used the more recent data in those situations.

[6]Grogger (2003) reports that using the credit rate instead of the maximum benefit makes no difference in his model of welfare transitions.

Several states have adopted state supplements based on the federal EITC, so there is some state variation in EITC as well as time variation in benefits.[7]

Local Labor and Marriage Markets

To measure job prospects, we impute county-level measures of skill-specific wages and employment probabilities by extending the work of Ribar (2003). In his work, Ribar constructed such measures for all counties from 1989 to 1997. He combined data from the Sample Edited Detail File (SEDF) of the 1990 decennial census and the 1990–1998 Annual Demographic Files of the Current Population Survey (CPS) together with industry wage and employment information from the Regional Economic Information System (REIS). To identify county of residence and work, he used the internal/confidential versions of the SEDF and CPS by special arrangement with the Census Bureau. He estimated wages and probabilities of employment based on CPS and SEDF data on personal characteristics from those files as well as local employment and earnings measures from the REIS. The selection-corrected wage regressions included county fixed effects and calendar time effects. We use these coefficients together with updated information from the REIS to impute wages and employment probabilities for women based on their county, education, age, and race over the period 1989–2000. We deflate earnings by the CPI-U. Table 1 shows the mean values. Predicted wages and employment are smaller for the nonheadship samples because of the lower average age of persons in those spells.

Since demographic decisions would be expected to depend on spouse availability, we construct a coarse measure of marriage market conditions. We use a race-specific county sex ratio based on the number of men and women aged 15–39. We use annual data from the 1990 decennial census and annual county population estimates. Small samples in some counties led to lopsided numbers, so we trimmed ratios that exceeded 5 or were less than 0.2 to those values.

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[7]We used state EITC information compiled by Nick Johnson at the Center on Budget and Policy Priorities, Washington, DC.

ECONOMETRIC SPECIFICATION

The study estimates hazard models of transitions from and into female headship and transitions from and into welfare participation. The transitions from female headship are specified to depend on welfare participation. The study applies Lillard's (1993) simultaneous hazards procedure to address problems of unobserved heterogeneity in all of the transition models and to account for the endogeneity of welfare participation in the headship model. The econometric specification is discussed in more detail below:

To examine the determinants of the timing of exits from female headship, the study estimates a log hazard model:

$$\ln h_H(t) = \mathrm{A}_H'\mathrm{T}_H(t) + \gamma P(t) + \mathrm{B}_H'\mathrm{X}(t) + \eta. \qquad (1)$$

The hazard, $h_H(t)$, represents the probability of exiting female headship at month t conditional on having remained a head until at least t. In Equation (1), $\mathrm{T}_H(t)$ represents a vector of duration parameters; $P(t)$ is a time-varying indicator for welfare participation; $\mathrm{X}(t)$ is a vector of other observed and possibly time-varying covariates; η is an unobserved, person-specific variable; and A_H, γ, and B_H are coefficients. The first term on the right-hand side of Equation (1), $\mathrm{A}_H'\mathrm{T}_H(t)$, is specified to be a linear spline in the spell duration. With this assumption, the hazard function has a piece-wise Gompertz specification.

The presence of unobserved heterogeneity in the hazard function is a substantial complication. Failure to account for such heterogeneity can lead to biased estimates of the coefficients (for instance, spurious indications of negative duration dependence). Following Lillard (1993), the study assumes that η is normally distributed with mean 0 and variance σ_η^2 and uses a maximum likelihood procedure that accounts for the distribution of headship spells under this assumption. The procedure is similar to the one developed by Butler and Moffitt (1982) for random-effect panel probit models in that it specifies the hazard function conditional on η and then integrates over the distribution and possible values of η.

Another complication is the endogenity of welfare participation. This problem is addressed by estimating models of headship and welfare participation jointly and allowing the unobserved determinants of these outcomes to be correlated.

Along with the model for exits from female headship, the study also estimates a model of the timing of entry into headship (exits from nonheadship). The log hazard for this outcome is specified as

$$\ln h_{NH}(t) = A_{NH}'T_{NH}(t) + B_{NH}'X(t) + \lambda_{NH}\eta \quad (2)$$

where $T_{NH}(t)$ is a vector of duration parameters, $X(t)$ and η are defined as before, and A_{NH}, B_{NH}, and λ_{NH} are coefficients. As with Equation (1), the log hazard for a spell of nonheadship is specified as a piece-wise Gompertz distribution. The analysis allows for multiple spells of both headship and nonheadship.

As Equations (1) and (2) indicate, a single unobserved factor is the source of unobserved heterogeneity in the hazard models for headship and nonheadship. The coefficient λ_{NH} in Equation (2) relaxes the distribution somewhat. Without the coefficient (i.e., with $\lambda_{NH} = 1$), the sources of unobserved heterogeneity in the headship and nonheadship models would be restricted to having the same variances and to being perfectly, positively correlated. With the coefficient, the sources of unobserved heterogeneity in the two models can have different variances and be either perfectly positively *or* perfectly negatively correlated. Although the single factor assumption clearly restricts the correlation between the sources of heterogeneity, it is adopted for reasons of tractability.

The log hazard functions for spells of welfare participation and nonparticipation are specified as

$$\ln h_W(t) = A_W'T_W(t) + \Psi_W'Z(t) + \mu \quad (3)$$

$$\ln h_{NW}(t) = A_{NW}'T_{NW}(t) + \Psi_{NW}'Z(t) + \lambda_{NW}\mu \quad (4)$$

where $T_W(t)$ and $T_{NW}(t)$ are vectors of duration parameters; $Z(t)$ is a vector of observed covariates; μ is an unobserved, person-specific variable; and A_W, A_{NW}, Ψ_W, Ψ_{NW}, and λ_{NW} are coefficients. The unobserved variable μ is assumed to be normally distributed with mean 0 and variance σ_μ^2. It is also assumed to be correlated with η (correlation coefficient ρ).

The four log hazard models are estimated jointly as a single system using the aML software package. The aML package employs Gaussian quadrature—a numerical approximation procedure—to evaluate the integrals over the two sources of unobserved heterogeneity. This study reports estimates from models that use eight quadrature points in each dimension, or 64 points total. Initial tests revealed that there were no noticeable differences in results between models that use six and eight points in each dimension.

ESTIMATION RESULTS

Each of the models for female headship and welfare participation includes a piecewise linear specification for a baseline hazard. Preliminary models were estimated to determine the elements that would be included in $T_H(t)$, $T_{NH}(t)$, $T_W(t)$, and $T_{NW}(t)$—that is, to find the locations of the knots, or connections between segments, in the linear spline functions. To keep this initial specification search simple, the study restricted the elements of $T_H(t)$ and $T_{NH}(t)$ to be the same and restricted the elements of $T_W(t)$ and $T_{NW}(t)$ to be the same. Estimates from models with completely general duration patterns (dummy variables for each possible spell length) but no other controls guided the initial parameterizations of the piecewise linear baseline hazards. The study then added and deleted segments, checking to see whether these adjustments led to changes in the fit of the baseline models. The final baseline hazards for the headship and nonheadship models were specified to have six segments corresponding to 0–3, 4–6, 7–9, 10–12, 13–30, and 31–48 months. The baseline hazards for the welfare participation and nonparticipation models were specified to have three segments corresponding to 0–3, 4–6, and 7–48 months.[8]

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[8]The specific elements of $T_H(t)$ and $T_{NH}(t)$ are

$T_{0\text{-}3}(t) = \min(t, 3)$, $T_{4\text{-}6}(t) = \max[0, \min(t\text{-}4, 3)]$, $T_{7\text{-}9}(t) = \max[0, \min(t\text{-}7, 3)]$,

$T_{10\text{-}12}(t) = \max[0, \min(t\text{-}10, 3)]$, $T_{13\text{-}30}(t) = \max[0, \min(t\text{-}13, 17)]$, $T_{31\text{-}48}(t) = \max(0, t\text{-}31)$.

The specific elements of $T_W(t)$ and $T_{NW}(t)$ are $T_{0\text{-}3}(t)$, $T_{4\text{-}6}(t)$, and $T_{7\text{-}48}(t) = \max(0, t\text{-}7)$.

A similar procedure was employed to introduce a piecewise linear time trend into the models. The calendar time trend accounts for changes in national policies and socioeconomic conditions as well as differences across panels of the SIPP. The models for female headship and nonheadship allow for different trends over the periods 1989–1991, 1992–1997, and 1998–2000, while the models for welfare participation and nonparticipation allow for different trends over the periods 1989–1990, 1991–1998, and 1999–2000. The underlying variables for the trend segments are expressed in terms of calendar months since the end of 1988.

Table 2 reports coefficients for the welfare participation, welfare policy, and local economic variables for three specifications of the system of transition models. The specifications differ in their controls for unobserved heterogeneity. The first column of Table 2 lists results from a specification that omits controls for unobserved heterogeneity. The second column lists results from a specification that includes controls for η and μ but restricts these to be independent. The third column lists results from a specification that allows η and μ to be correlated. For each specification, coefficients from the female headship hazard model are reported first; coefficients from the nonheadship hazard model are reported second; coefficients from the welfare participation hazard model are reported third; and coefficients from the nonparticipation model are reported last. For brevity, Table 2 only reports a subset of coefficients from each model. In addition to the listed variables, the hazard models also include controls for race, ethnicity, age, education, metropolitan residence, and the local sex ratio. Complete results for the specification reported in the third column of Table 2 are given in Appendix Table A. Complete results for the other specifications are available from the authors.

Estimation reveals that the controls for unobserved heterogeneity are statistically significant. In particular, the standard deviation for η in the headship model and the factor loading on η in the nonheadship model are each individually distinguishable from zero (the factor loading is not statistically different from one, however). The corresponding parameters for μ are jointly but not individually significant. The positive factor loading in the female headship equation indicates that those prone to short spells of headship are also prone to short spells of nonheadship. Thus, η appears to be associated with family instability generally. A similar interpretation applies to the coefficient in the welfare model, though this coefficient is not significant. In the third specification, the correlation coefficient ρ is significantly negative. This indicates that characteristics contributing to instability in living arrangements are associated with longer and more stable welfare program arrangements. Because specification tests reject the restrictions in the first two specifications, the discussion of empirical findings will focus on the coefficients from the third (least restrictive) specification. We note, however, that the coefficients reported in Table 2 are not especially sensitive to the use of controls for unobserved heterogeneity.

Welfare participation is estimated to reduce the hazard of exiting female headship—that is, contribute to longer spells of headship. The estimated relationship is consistent with expectations and stronger than the preliminary results reported by Teitler et al. (2003). Estimates of the association between welfare participation and headship that account for correlations in the unobserved determinants in these outcomes are 10 to 15 percent smaller than estimates that do not account for such correlations. Thus correcting for correlated heterogeneity makes a small to modest difference.

Among the welfare policy variables, more generous welfare benefits are estimated to hasten unmarried mothers' participation in welfare. Benefits are also estimated to reduce exits from the welfare rolls, though the coefficient falls just below the threshold for statistical significance (two-tailed *p* value = .108). The coefficients for the welfare benefit variables are small and insignificant in the hazard models for headship and nonheadship. Taken together, the estimates indicate that welfare benefits contribute indirectly to female headship by increasing welfare participation; however, there is no strong evidence of any additional direct association once participation is taken into account. None of the coefficients for the waiver variables is statistically different from zero. The weak results for waivers are consistent with our earlier findings for headship (Fitzgerald and Ribar, 2003) and welfare participation (Ribar, 2002).

More generous benefits under the EITC are associated with longer spells of all four outcomes: headship, nonheadship, participation, and nonparticipation. Thus, the EITC appears to contribute to stability in both living and program arrangements. The finding that the EITC is associated with longer welfare spells is surprising but may reflect the subsidy allowing mothers to combine welfare and work careers. Previous research by Meyer and Rosenbaum (2001) indicated that the expansions in the EITC increased work but reduced welfare receipt, while research by Dickert-Conlin and Houser (1999) indicated that the subsidy reduced headship.

Better economic opportunities in the respondent's county of residence in the form of higher average wages for women of the same age, race, and educational attainment significantly reduce the probability of exiting headship but also reduce the chances of entering welfare. The findings suggest that wage opportunities contribute to women's financial independence. The study's other measure of economic opportunities, the local skill-specific employment probability, is estimated to be positively associated with welfare exits.

The coefficients for the other observed variables (shown in Appendix Table A) either have the expected signs or are insignificant. In particular, black and Hispanic women are generally estimated to have higher risks of headship and welfare participation than other women. The hazard for entry into female headship rises through age 18 then falls with age. The hazard for exiting headship increases with age, while the hazard for entering welfare falls with age. Higher levels of education help women avoid both headship and welfare participation. The hazards of exiting headship, nonheadship, and welfare participation increase with duration during the first 3 months of a spell. All four hazards generally decrease with duration after 4 months. The coefficients on the trend variables indicate that all four hazards were falling in the late 1990s.

Table 3 reports welfare participation, welfare policy, and economic condition coefficients from three alternative specifications of the system of transition models. One issue that the study examines more carefully is whether the welfare policy variables have any independent effect on the duration of female headship once welfare participation is taken into account. The estimates from Table 2 indicate that the benefit level affects headship through welfare participation but that there are no additional independent effects of either the benefit level or waiver policies. The first column in Table 3 lists results from a specification that omits the welfare benefit and waiver variables from the headship equation. Other than these two exclusions, the specification includes all of the observed variables and statistical controls as the third specification from Table 2 (i.e., is nested within the previous specification). Thus, it can be used to test the joint significance of the policy variables in the headship model and examine the sensitivity of the welfare participation coefficient to their inclusion or exclusion. Comparisons across tables indicate that there is only a small change in the log likelihood function and no noticeable change in the coefficient for welfare participation, thus confirming our interpretation.

The second column in Table 3 lists results from a specification that adds an indicator for the implementation of TANF to each of the four hazard models. Most states had reformed their welfare programs through the Section 1115 waiver process by the end of 1996; however, as a result of the PRWORA all states were subsequently required to implement TANF programs. In some states, the TANF programs followed the general contours of the waiver provisions. In other states, TANF represented a substantial change in direction or the actual start of the reform process. Including indicators for both waiver adoption and TANF implementation provides a more complete description of reform efforts and allows for differences between waiver and TANF policies. The estimated coefficients for TANF, however, are all statistically weak, and a likelihood ratio test indicates that they are jointly insignificant. The strongest result appears in the hazard model for nonparticipation. The coefficient suggests that TANF may have slowed and reduced entry into welfare, but the *p* value is only .175.

The third specification replaces the single indicator for adopting any type of welfare waiver with seven separate indicators for different types of waivers. It is reasonable to expect that some types of waivers might have stronger or weaker effects, or possibly even differently signed effects, on headship and participation outcomes. The third specification allows for such effects but at the potential expense of a loss of statistical power if the policies are closely related or only implemented in a few locations. Estimation reveals that few of the individual waiver indicators are statistically significant (only four coefficients out of the 28 entered into the models). Of the coefficients that are significant, most have counterintuitive signs. For instance, teen coresidence requirements are associated with faster entry into headship, and term limits are associated with longer spells on welfare. The results provide little support for the hypothesis that waiver provisions played a meaningful role in the stabilization of headship rates or in the decline in welfare participation.

CONCLUSION

This study draws individual-level data on spells of female headship, nonheadship, welfare participation, and nonparticipation from several panels of the Survey of Income and Program Participation. Through an arrangement with the U.S. Census Bureau, it uses special versions of the SIPP that allow it to link these data with state-level indicators of welfare policies and county-level measures of economic and marriage opportunities. The study uses the combined data to estimate hazard models of the four spell outcomes. The estimation procedure accounts for correlated sources of unobserved heterogeneity in the determinants of spell lengths. The procedure also allows the study to consider welfare participation as an endogenous determinant of female headship spells.

Estimates from the hazard models indicate that welfare participation is significantly and negatively associated with the probability of leaving headship. This association is robust in terms of sign, magnitude, and statistical significance to the use of controls for endogeneity. The finding is consistent with welfare participation directly contributing to longer spells of female headship. The evidence regarding causality is stronger than that reported in some previous studies, but it is not definitive because the study's statistical methodology only accounts for endogeneity that arises from unobserved, time-invariant characteristics of people and relies on relatively strong assumptions regarding the distribution of these unobserved characteristics.

The study finds that the chances that an unmarried mother will enroll in welfare increase with the level of benefits offered by her state of residence. There is also weak evidence that benefits encourage unmarried mothers to remain on welfare. More generous benefits are indirectly associated with longer spells of female headship through their association with welfare participation. The study does not find evidence that benefits have an additional, direct impact on headship, once the effect through welfare participation is taken into account. Other welfare policies, as measured by the adoption of program waivers and the implementation of TANF, are not strongly associated with female headship or welfare participation. Thus, aside from changes in benefits, it does not appear that reforms enacted during the 1990s contributed substantially to the stabilization of headship rates or the reduction in welfare caseloads.

A strength of this study is its use of skill-specific, county-level controls for wage and employment opportunities. Higher wages are associated with longer spells of female headship as well as longer spells off of welfare. These results, along with like-signed estimates for EITC benefits, suggest that earnings contribute to women's economic independence—both from potential husbands and from the welfare system.

Some limitations of the study should also be kept in mind in interpreting the results. The biggest limitation is the short observational window available in the SIPP. In no instance could the study examine headship or welfare participation spells that lasted more than 4 years. Shorter time frames for some panels, attrition from the surveys, and the study's exclusion of initially ongoing (left-censored) spells further limited the number of transitions that could be examined. While the breadth of coverage makes the SIPP a logical choice for examining welfare policies, surveys with a greater length of coverage, such as the Panel Study of Income Dynamics, should also be considered in future work. Other limitations of the study include the strong parametric assumptions in the hazard functions and the complexity of the estimation methods. Despite these limitations, we are confident that our study contributes to an emerging consensus that welfare reform has had no more than a modest effect on demographic outcomes.

References

Acs, Gregory. 1995. "Do Welfare Benefits Promote Out-of-Wedlock Childbearing?" In *Welfare Reform: An Analysis of the Issues*, edited by I. Sawhill. Washington, DC: Urban Institute.

Amato, P. R. 1993. "Children's Adjustment to Divorce: Theories, Hypotheses, and Empirical Support." *Journal of Marriage and the Family* 55: 23–38.

Amato, P. R., L. S. Loomis, and A. Booth. 1995. "Parental Divorce, Marital Conflict, and Offspring Well-being during Early Adulthood." *Social Forces* 73: 895–915.

Becker, G. S. 1981. *A Treatise on the Family*. Cambridge, MA: Harvard University Press.

Bitler, M. P., J. B. Gelbach, and H. W. Hoynes. 2002. "The Impact of Welfare Reform on Living Arrangements." Working Paper No. w8784. Cambridge, MA: National Bureau of Economic Research.

Bitler, M. P., J. B. Gelbach, H. W. Hoynes, and M. Zavodny. 2002. "The Impact of Welfare Reform on Marriage and Divorce." Unpublished manuscript. Santa Monica, CA: RAND.

Blank, R. M. 1999. "Analyzing the Length of Welfare Spells." *Journal of Public Economics* 39: 245–274.

Blank, R. M. 2002. "Evaluating Welfare Reform in the United States." *Journal of Economic Literatur*e 40: 1105–1166.

Blank, R. M., and P. Ruggles. 1996. "When Do Women Use Aid to Families with Dependent Children and Foodstamps? The Dynamics of Eligibility versus Participation." *Journal of Human Resources* 31: 57–89.

Butler, J. S., and Moffitt, R. A. 1982. "A Computationally Efficient Quadrature Procedure for the One-Factor Multinomial Probit Model." *Econometrica* 50: 761–764.

Crouse, Gil. 1999. "State Implementation of Major Changes to Welfare Policies, 1992–1998." U.S. Department of Health and Human Services, Assistant Secretary for Planning and Evaluation. <http://aspe.hhs.gov/hsp/Waiver-Policies99/policy_CEA.htm>.

DeLeire, T., and A. Kalil. 2002. "Good Things Come in Threes: Single-Parent Multigenerational Family Structure and Adolescent Adjustment." *Demography* 39: 393–413.

Dickert-Conlin, S., and S. Houser. 1999. "EITC, AFDC, and the Female Headship Decision." Discussion Paper no. 1192-99. Madison, WI: Institute for Research on Poverty.

Duncan, G., and S. D. Hoffman. 1990. "Welfare Benefits, Economic Opportunities, and Out-of-Wedlock Births Among Black Teenage Girls." *Demography* 27: 519–535.

Fitzgerald, J. M. 1995. "Local Labor Markets and Local Area Effects on Welfare Duration." *Journal of Policy Analysis and Management* 14: 43–67.

Fitzgerald, J. M., and D. C. Ribar. 2003. "The Impact of Welfare Reform on Female Headship Decisions." Unpublished manuscript. Bowdoin College.

Gennetian, L. A., and V. Knox. 2003. "Staying Single: The Effects of Welfare Reform Policies on Marriage and Cohabitation." The Next Generation Working Paper Series no. 13. New York: MDRC.

Gittleman, M. 2001. "Declining Caseloads: What Do the Dynamics of Welfare Participation Reveal." *Industrial Relations* 40: 537–70.

Grogger, J. 2003. "The Effects of Time Limits and Other Policy Changes on Welfare Use, Work and Income among Female-Headed Families." *Review of Economics and Statistics* 85: 394–408.

Grogger, J., L. Karoly, and J. A. Klerman. 2001. "Consequences of Welfare Reform: A Research Synthesis." Draft Tech. Report No. DREU-2676-DHHS. Santa Monica: RAND.

Harvey, C., M. J. Camasso, and R. Jagannathan. 2000. "Evaluating Welfare Reform Waivers under Section 1115." *Journal of Economic Perspectives* 14: 165–188.

Haveman, R., and B. Wolfe. 1994. *Succeeding Generations: On the Effects of Investments in Children*. New York: Russell Sage Foundation.

Hofferth, S. L., and K. G. Anderson. 2003. "Are All Dads Equal? Biology Versus Marriage as a Basis for Paternal Investment." *Journal of Marriage and the Family* 65: 213–232.

Hoffman, S. D., and G. J. Duncan. 1995. "The Effect of Incomes, Wages, and AFDC Benefits on Marital Disruption." *Journal of Human Resources* 30(1): 19–41.

Horvath-Rose, A., and H. E. Peters. 2001. "Welfare Waivers and Non-Marital Childbearing." In *Welfare Reform: For Better, For Worse*, edited by G. Duncan and L. Chase-Lansdale. New York: Russell Sage. Pp. 222–244.

Hoynes, H. W. 1997a. "Does Welfare Play Any Role in Female Headship Decisions?" *Journal of Public Economics* 65: 89–117.

Hoynes, H. W. 1997b. "Work, Welfare, and Family Structure: What Have We Learned?" In *Fiscal Policy: Lessons from Economic Research*, edited by A. J. Auerbach. Cambridge, MA: MIT Press. Pp. 101–146.

Jekielek, S. M. 1998. "Parental Conflict, Marital Disruption and Children's Emotional Well-Being." *Social Forces* 76: 905–936.

Keane, M. P., and K. I. Wolpin. 2002. "Estimating Welfare Effects Consistent with Forward Looking Behavior, Part II: Empirical Results." *Journal of Human Resources* 37:600–622.

Klerman, J., and S. Haider. 2000. "A Stock-Flow Analysis of the Welfare Caseload: Insights from California Economic Conditions." Unpublished manuscript. Santa Monica, CA: RAND.

Lerman, R. 1996. "The Impact of the Changing U.S. Family Structure on Child Poverty and Income Inequality." *Economica* 63: S119–S139.

Lillard, L. 1993. "Simultaneous Equations for Hazards: Marriage Duration and Fertility Timing." *Journal of Econometrics* 56: 189–217.

McLanahan, S. S., and G. Sandefur. 1994. *Growing Up with a Single Parent: What Hurts, What Helps*. Cambridge, MA: Harvard University Press.

Meyer, B. D., and D. T. Rosenbaum. 2001. "Welfare, the Earned Income Tax Credit, and the Labor Supply of Single Mothers." *Quarterly Journal of Economics* 116: 1063–1114.

Moffitt, R. A. 1995. "The Effect of the Welfare System on Non-marital Childbearing." In *Report to Congress on Out-of-Wedlock Childbearing*. Hyattsville, MD: National Center for Health Statistics.

Moffitt, R. A. 1998. "The Effect of Welfare on Marriage and Fertility." In *Welfare, the Family, and Reproductive Behavior*, edited by R. A. Moffitt. Washington, DC: National Academy Press.

Moffitt, R. A. 2001. "Welfare Benefits and Female Headship in U.S. Time Series." Discussion Paper no. 1219-01. Madison, WI: Institute for Research on Poverty.

Moffitt, R. A. 2002. "The Temporary Assistance for Needy Families Program." National Bureau of Economic Research Working Paper, No. 8749.

Moffitt, R. A., and M. S. Rendall. 1995. "Cohort Trends in the Lifetime Distribution of Female Family Headship in the United States, 1968–1985." *Demography* 32: 407–424.

Morrison, D. R., and M. J. Coiro. 1999. "Parental Conflict and Marital Disruption: Do Children Benefit When High-Conflict Marriages Are Dissolved?" *Journal of Marriage and the Family* 61: 626–637.

Murray, C. 1984. *Losing Ground*. New York: Basic Books.

Peters, H. E., R. D. Plotnick, and S. Jeong. 2003. "How Will Welfare Reform Affect Childbearing and Family Structure Decisions?" In *Changing Welfare*, edited by R. A. Gordon and H. J. Walberg. Amsterdam: Kluwer Academic Publishers.

Ribar, D. C. 1998. "Economic Opportunities and Young Women's Premarital Childbearing." Unpublished manuscript. Washington, DC: George Washington University.

Ribar, D. C. 2002. "Transitions from Welfare and the Employment Prospects of Low-Skill Women." Unpublished manuscript. Washington, DC: George Washington University.

Ribar, D. C. 2003. "County-Level Estimates of the Employment Prospects of Low-Skill Workers." In *Worker Well-being and Public Policy, Research in Labor Economics*, Vol. 22, edited by S. W. Polachek. Amsterdam: Elsevier Science. Pp. 227–268.

Rosensweig, M. R. 1999. "Welfare, Marital Prospects, and Nonmarital Childbearing." *Journal of Political Economy* 107: S3–S32.

Schoeni, R. F., and R. M. Blank. 2000. "What has Welfare Reform Accomplished? Impacts on Welfare Participation, Employment, and Family Structure." Working Paper no. w7627. Cambridge, MA: National Bureau of Economic Research.

Teitler, J. O., N. E. Reichman, I. Garfinkel, and L. Nepomnyaschy. 2003. "TANF Participation and Marriage." Unpublished manuscript. Columbia University.

U.S. Department of Health and Human Services, Assistant Secretary for Planning and Evaluation. 1997. *Setting the Baseline: A Report on State Welfare Waivers*. <http://aspe.hhs.gov/hsp/isp/waiver2/title.htm>.

TABLE 1
Means of the Analysis Variables

a. Fixed Individual Characteristics

Variable	
Black	0.18
Hispanic	0.13
Number of individuals	12685

b. Spell Characteristics

	Female Headship	Nonheadship	Welfare Participation	Welfare Nonparticip.
Characteristics of spells				
Spell length	13.6	18.6	10.2	11.9
Proportion right-censored	0.79	0.93	0.65	0.89
Age at start of spell	29.6	21.5	25.8	29.9
Education at start of spell	12.0	9.8	11.3	12.1
Number of spells	3643	10511	923	3373
Time-varying characteristics of spells				
Welfare participation	0.19	-	-	-
Maximum welfare benefit	351	355	379	345
Adopted any waiver	0.50	0.51	0.45	0.52
Term limit	0.14	0.15	0.08	0.16
Family cap	0.25	0.24	0.19	0.27
Teen coresidence requirement	0.23	0.23	0.18	0.24
AFDC-UP change	0.31	0.31	0.30	0.31
Work requirement	0.14	0.12	0.17	0.13
Earnings disregard change	0.29	0.28	0.29	0.28
JOBS change	0.24	0.25	0.15	0.26
Implemented TANF	0.38	0.38	0.27	0.41
EITC benefit	2530	2523	2375	2567
Log real wage in county	1.52	1.11	1.39	1.56
Employment probability in county	0.71	0.52	0.65	0.72
Sex ratio	1.01	1.02	1.00	1.01
Metropolitan residence	0.81	0.79	0.82	0.81
Number of observations	13833	52032	2666	11167

Note: Figures calculated from the 1990, 1992, 1993, and 1996 panels of the SIPP. Figures represent means unless otherwise indicated. Welfare participation and nonparticipation measured only during headship spells.

TABLE 2
Selected Coefficients from Hazard Models

	No Controls for Unobserved Heterogeneity		Uncorrelated Controls for Unobserved Heterogeneity		Correlated Controls for Unobserved Heterogeneity	
Headship						
Welfare participation	-0.48***	(0.12)	-0.50***	(0.12)	-0.43***	(0.13)
Adopted any waiver	0.08	(0.11)	0.08	(0.11)	0.08	(0.11)
Max. welfare benefits (/100)	-0.01	(0.03)	-0.01	(0.03)	-0.01	(0.03)
EITC benefit (/1000)	-0.24*	(0.13)	-0.27**	(0.13)	-0.26**	(0.13)
Log real wage in county	-0.48**	(0.23)	-0.55**	(0.25)	-0.53**	(0.24)
Emp. prob. in county	0.59	(0.54)	0.84	(0.57)	0.81	(0.56)
σ_η	-		0.55***	(0.17)	0.42***	(0.13)
Nonheadship						
Adopted any waiver	-0.002	(0.11)	0.003	(0.11)	0.01	(0.12)
Max. welfare benefits (/100)	-0.02	(0.03)	-0.02	(0.04)	-0.03	(0.04)
EITC benefit (/1000)	-0.38***	(0.14)	-0.41***	(0.14)	-0.42***	(0.14)
Log real wage in county	0.25	(0.30)	0.28	(0.32)	0.29	(0.33)
Emp. prob. in county	-0.40	(0.62)	-0.51	(0.65)	-0.56	(0.67)
λ_{NH}	-		1.19*	(0.64)	1.94**	(0.89)
Welfare participation						
Adopted any waiver	-0.12	(0.16)	-0.13	(0.16)	-0.12	(0.16)
Max. welfare benefits (/100)	-0.09	(0.06)	-0.09	(0.06)	-0.09	(0.06)
EITC benefit (/1000)	-0.61***	(0.20)	-0.61***	(0.21)	-0.60***	(0.21)
Log real wage in county	-0.48	(0.46)	-0.47	(0.47)	-0.47	(0.47)
Emp. prob. in county	1.46*	(0.82)	1.46*	(0.83)	1.43*	(0.84)
σ_μ	-		0.15	(0.12)	0.11	(0.12)
Welfare nonparticipation						
Adopted any waiver	-0.02	(0.16)	-0.03	(0.19)	-0.04	(0.18)
Max. welfare benefits (/100)	0.13***	(0.05)	0.14***	(0.06)	0.14**	(0.06)
EITC benefit (/1000)	-0.71***	(0.18)	-0.79***	(0.20)	-0.78***	(0.20)
Log real wage in county	-0.91**	(0.39)	-1.00**	(0.47)	-0.95**	(0.47)
Emp. prob. in county	0.81	(0.71)	0.81	(0.87)	0.59	(0.88)
λ_{NW}	-		7.73	(6.89)	9.75	(11.1)
ρ	-		-		-0.38**	(0.19)
Log likelihood	-11229.84		-11207.10		-11205.04	

Note: Hazard models estimated using data from the 1990, 1992, 1993, and 1996 panels of the SIPP. Models include splines for duration and calendar year effects and controls for race, ethnicity, age, education, metropolitan residence and sex ratio. Standard errors in parentheses.
* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

TABLE 3
Selected Coefficients from Hazard Models with Different Policy Controls

	Controls for Welfare Participation Only		Controls for TANF Implementation		Controls for Detailed Waiver Provisions	
Headship						
Welfare participation	-0.43***	(0.13)	-0.43***	(0.13)	-0.43***	(0.13)
Adopted any waiver	-		0.08	(0.11)	-	
Term limit	-		-		0.11	(0.16)
Family cap	-		-		0.01	(0.12)
Teen coresidence requirement	-		-		0.11	(0.12)
AFDC-UP change	-		-		-0.02	(0.13)
Work requirement	-		-		-0.05	(0.17)
Earnings disregard change	-		-		-0.05	(0.12)
JOBS change	-		-		0.05	(0.13)
Implemented TANF	-		-0.07	(0.18)	-0.14	(0.19)
Max. welfare benefits (/100)	-		-0.01	(0.03)	0.01	(0.03)
EITC benefit (/1000)	-0.27**	(0.13)	-0.29**	(0.14)	-0.32**	(0.15)
Log real wage in county	-0.53**	(0.22)	-0.53**	(0.24)	-0.54**	(0.25)
Emp. prob. in county	0.82	(0.54)	0.81	(0.56)	0.78	(0.58)
σ_η	0.42***	(0.12)	0.43***	(0.13)	0.45***	(0.13)
Nonheadship						
Adopted any waiver	0.01	(0.12)	0.01	(0.12)	-	
Term limit	-		-		0.11	(0.18)
Family cap	-		-		-0.004	(0.12)
Teen coresidence requirement	-		-		0.24**	(0.12)
AFDC-UP change	-		-		-0.04	(0.15)
Work requirement	-		-		0.13	(0.19)
Earnings disregard change	-		-		-0.13	(0.12)
JOBS change	-		-		-0.07	(0.14)
Implemented TANF	-		0.03	(0.19)	-0.06	(0.20)
Max. welfare benefits (/100)	-0.03	(0.04)	-0.03	(0.04)	-0.02	(0.04)
EITC benefit (/1000)	-0.42***	(0.14)	-0.41***	(0.15)	-0.46***	(0.16)
Log real wage in county	0.29	(0.33)	0.29	(0.33)	0.33	(0.33)
Emp. prob. in county	-0.55	(0.67)	-0.56	(0.67)	-0.68	(0.68)
λ_{NH}	1.93**	(0.89)	1.90**	(0.89)	1.80**	(0.86)

(table continues)

TABLE 3, continued

	Controls for Welfare Participation Only		Controls for TANF Implementation		Controls for Detailed Waiver Provisions	
Welfare participation						
Adopted any waiver	-0.12	(0.16)	-0.12	(0.16)	-	
Term limit	-		-		-0.57*	(0.31)
Family cap	-		-		0.13	(0.18)
Teen coresidence requirement	-		-		0.14	(0.19)
AFDC-UP change	-		-		0.15	(0.24)
Work requirement	-		-		-0.45	(0.30)
Earnings disregard change	-		-		-0.13	(0.21)
JOBS change	-		-		0.12	(0.21)
Implemented TANF	-		-0.17	(0.24)	-0.20	(0.26)
Max. welfare benefits (/100)	-0.09	(0.06)	-0.09	(0.06)	-0.08	(0.06)
EITC benefit (/1000)	-0.60***	(0.21)	-0.66***	(0.23)	-0.82***	(0.24)
Log real wage in county	-0.47	(0.47)	-0.47	(0.47)	-0.57	(0.47)
Emp. prob. in county	1.43*	(0.84)	1.42*	(0.84)	1.62*	(0.85)
σ_μ	0.11	(0.12)	0.11	(0.12)	0.11	(0.13)
Welfare nonparticipation						
Adopted any waiver	-0.04	(0.18)	-0.03	(0.19)	-	
Term limit	-		-		0.18	(0.33)
Family cap	-		-		0.37*	(0.21)
Teen coresidence requirement	-		-		-0.001	(0.22)
AFDC-UP change	-		-		0.23	(0.25)
Work requirement	-		-		0.46	(0.30)
Earnings disregard change	-		-		-0.28	(0.23)
JOBS change	-		-		-0.60**	(0.25)
Implemented TANF	-		-0.36	(0.26)	-0.32	(0.28)
Max. welfare benefits (/100)	0.14**	(0.06)	0.14**	(0.06)	0.10*	(0.06)
EITC benefit (/1000)	-0.78***	(0.20)	-0.88***	(0.23)	-0.81***	(0.23)
Log real wage in county	-0.94**	(0.47)	-0.96**	(0.47)	-0.83*	(0.49)
Emp. prob. in county	0.59	(0.88)	0.64	(0.88)	0.52	(0.90)
λ_{NW}	9.75	(11.1)	10.0	(11.4)	9.82	(11.4)
ρ	-0.38**	(0.19)	-0.36*	(0.19)	-0.34*	(0.19)
Log likelihood	-11205.35		-11203.63		-11185.48	

Note: Hazard models estimated using data from the 1990, 1992, 1993, and 1996 panels of the SIPP. Models include splines for duration and calendar year effects and controls for race, ethnicity, age, education, metropolitan residence, and sex ratio. Standard errors in parentheses.
* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.

APPENDIX TABLE A
Full Results from Preferred Hazard Model

	Female Headship		Nonheadship		Welfare Participation		Welfare Nonparticipation	
Linear spline for duration								
0–3 months	1.20***	(0.12)	1.21***	(0.15)	0.62***	(0.12)	-0.08	(0.08)
4–6 months	-0.42***	(0.06)	-0.22***	(0.07)	-0.23***	(0.07)	-0.22***	(0.07)
7–9 months	0.10	(0.07)	0.14*	(0.08)	-		-	
10–12 months	-0.13**	(0.07)	-0.24***	(0.07)	-		-	
13–30 months	0.01	(0.01)	0.02	(0.01)	-		-	
31–48 months	-0.13*	(0.08)	0.03	(0.03)	-		-	
7–48 months	-		-		-0.001	(0.01)	-0.04*	(0.02)
Linear spline for time trend								
1989–1991	-0.03**	(0.01)	0.02	(0.01)	-		-	
1992–1997	0.01	(0.005)	0.01**	(0.005)	-		-	
1998–2000	-0.02***	(0.01)	-0.02***	(0.01)	-		-	
1989–1990	-		-		0.001	(0.18)	0.24***	(0.09)
1991–1998	-		-		0.03***	(0.01)	0.02**	(0.01)
1999–2000	-		-		-0.08**	(0.03)	-0.08**	(0.03)
Other covariates and controls								
Welfare participation	-0.43***	(0.13)	-		-		-	
Adopted any waiver	0.08	(0.11)	0.01	(0.12)	-0.12	(0.16)	-0.04	(0.18)
Max. welfare ben. (/100)	-0.01	(0.03)	-0.03	(0.04)	-0.09	(0.06)	0.14**	(0.06)
EITC benefit (/1000)	-0.26**	(0.13)	-0.42***	(0.14)	-0.60***	(0.21)	-0.78***	(0.20)
Log real wage in county	-0.53**	(0.24)	0.29	(0.33)	-0.47	(0.47)	-0.95**	(0.47)
Emp. prob. in county	0.81	(0.56)	-0.56	(0.67)	1.43*	(0.84)	0.59	(0.88)
Sex ratio in county	0.11	(0.37)	0.30	(0.32)	-		-	
Metropolitan residence	-0.06	(0.10)	0.10	(0.12)	-0.12	(0.17)	-0.01	(0.17)
Age at start of spell	0.04***	(0.01)	-0.05***	(0.01)	0.001	(0.01)	-0.05***	(0.01)
Age = 15	-		-3.16***	(0.20)	-		-	
Age = 16	-		-2.55***	(0.27)	-		-	
Age = 17	-		-0.17	(0.42)	-		-	
Age = 18	-		0.71*	(0.39)	-		-	
Education at start of spell	-0.03	(0.02)	-0.05*	(0.03)	0.02	(0.05)	-0.12**	(0.05)
Black	-0.48***	(0.11)	0.77***	(0.11)	-0.48***	(0.15)	0.40***	(0.15)
Hispanic	-0.30**	(0.12)	0.44***	(0.12)	-0.52***	(0.17)	-0.19	(0.18)
Intercept	-5.66***	(0.70)	-6.00***	(0.76)	-4.60	(4.25)	-6.05***	(2.11)
σ_η, σ_μ	0.42***	(0.13)	-		0.11	(0.12)	-	
λ_{NH}, λ_{NW}	-		1.94**	(0.89)	-		9.75	(11.1)
P				-0.38**	(0.19)			
Log likelihood				-11205.04				

Note: Hazard models estimated using data from the 1990, 1992, 1993, and 1996 panels of the SIPP. Standard errors in parentheses.
* Significant at .10 level. ** Significant at .05 level. *** Significant at .01 level.